

**REMARKS**

Claims 22-44 are currently pending in this application.

Claims 22-24, 32-34, and 38 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek (U.S. Patent No. 5,206,066) in view of Michel et al. (U.S. Patent No. 4,081,426).

With respect to claims 22 and 23, the Office Action alleges that Horacek teaches a melamine resin (page 1: lines 1-5) comprising an etherified melamine resin (1:59-63) that has been etherified with  $C_{1-4}$ alkanols/ $R_3$  (2:1-2) and crosslinked with polyether diols, that can be polytetrahydrofuran-diol, polypropylene glycol, ethylene glycol, propylene glycol, or dipropylene glycol/bridging units of the formula  $-NH-CHR_2-O-R_4-O-CHR_2-NH-$  (1:64-68), wherein the molar ratio of the substituents  $R_3:R_4$  are 20:1 to 1:20 (1:45-55), the proportion of the combination of the triazine segments through the polyethers is from 5 to 95 mol% (1:50-55).

The Office Action acknowledges that Horacek does not teach the molar ratio of melamine to formaldehyde as being from 1:2.5-3.5 as is presently claimed. However, Michel et al. allegedly teaches a melamine resin with a ratio of melamine to formaldehyde of 1:0.77 to 3.0 mol (1:63-67). The Office Action contends that Horacek and Michel et al. are analogous art as they are concerned with the same field of endeavor, namely etherified aminoplast resins, and concludes that it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the ratio of Michel et al. in the resin of Horacek, and the motivation to do so would have been, as Michel et al. allegedly suggests, to control the degree of condensation in the reaction resin (1:63-2:10).

The Office Action acknowledges that Horacek is silent regarding the molecular weight of the resin. However, the Office Action contends that since Horacek teaches fully curing a melamine resin precondensate with polyether diols, it would appear to provide the claimed molecular weight. The burden has been placed on the Applicants to show that the process of modified Horacek would not result in a product possessing the claimed number of triazine units.

With respect to claim 24, Horacek allegedly teaches using formaldehyde to produce the melamine resin/ $R_2$  is H (1:45-49). With respect to claim 32, Horacek allegedly

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teaches making a laminate from the composition (3:55-57). With respect to claims 33 and 34, Horacek allegedly teaches a prepreg/semi-finished product produced from fibers (3:27-32) that can be used in films/coatings (1:11-17). With respect to claim 38, Horacek allegedly teaches fiber reinforcement that is glass, carbon or aramid fibers (3:16-20).

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As reiterated by the Supreme Court in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. \_\_\_, 82 U.S.P.Q.2d 1385 (2007), the framework for the objective analysis for determining obviousness under 35 U.S.C. §103 is stated in *Graham v. John Deere*. Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg., No. 195 (October 10, 2007) at page 57527 (hereinafter "Examination Guidelines"). The factual inquiries enunciated by the Court are as follows:

- (1) Determining the scope and content of the prior art;
- (2) Ascertaining the differences between the claimed invention and the prior art; and
- (3) Resolving the level of ordinary skill in the pertinent art.

Examination Guidelines at page 57527.

Applicants have submitted herewith the Declaration of Dr. Manfred Rätzsch (hereinafter the "Rätzsch Declaration"), who is a named inventor of the invention disclosed and claimed in the subject patent application, U.S. Patent Application No. 10/517,864. Rätzsch Declaration at paragraph 1.

Dr. Rätzsch received the degree of Dr rer. nat in Physical Chemistry in 1958 at the University Leipzig (Germany), the degree of Dr habil. and the professorship in Polymer Technology at the University of Halle-Merseburg (Germany) in 1963. Rätzsch Declaration at paragraph 2.

Dr. Rätzsch has been the head and president of research of the Polymer Dept. of the chemical company "Leuna Werke" (Germany) with 3000 employees for 15 years. In 1979, Dr. Rätzsch was appointed as a director of the "Institute of Polymer Technology" of the Academy of Science in Dresden (Germany). In 1989, Dr. Rätzsch started as a Vice President of R&D at the PCD (Austria). At that time, Dr. Rätzsch was appointed as an

associated Prof. at the Universities of Leoben (Austria) and Linz (Austria). In 2000, the R&D group was taken over by the Borealis Company. Since 2001, Dr. Rätzsch has been working as a consultant with AMI-Agrolinz Melamine International GmbH. Dr. Rätzsch is the author and coauthor of 172 scientific publications, and more than 160 patents. Rätzsch Declaration at paragraph 3.

Dr. Rätzsch's working fields include the synthesis, characterization and application of condensation polymers, mainly based on melamine und urea formaldehyde resin. Additionally, Dr. Rätzsch is involved in the development of new aminoplasts with improved characteristics. Dr. Rätzsch considers himself an expert in these areas. Rätzsch Declaration at paragraph 4.

Dr. Rätzsch is familiar with the reasons for rejection of claims 22-24, 32-34 and 38 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,206,066 ("Horacek") in view of U.S. Patent No. 4,081,426 ("Michel et al."), as well as the other §103(a) rejections based upon the Horacek reference set forth in the Office Action dated July 16, 2008 for the above-identified patent application. Rätzsch Declaration at paragraph 5.

Dr. Rätzsch is familiar with U.S. Patent No. 5,206,066 (Horacek). Rätzsch Declaration at paragraph 6. In his Declaration, Dr. Rätzsch states that Horacek teaches a melamine resin comprising a) partly etherified melamine resin obtainable by reaction of melamine, formaldehyde and C<sub>1</sub>-C<sub>8</sub>-alkanols in a molar ratio of melamine:formaldehyde:alkanol of 1: (5 to 6): (4 to 6), and b) diols consisting of polyester-diols and/or polyether diols having a molecular weight of at least 400 g/mol and low molecular weight C<sub>2</sub>-C<sub>12</sub> diols. Rätzsch Declaration at paragraph 6.

The excess of formaldehyde provides for a highly substituted melamine, e.g., the amino groups of the melamine nuclei can be substituted up to 6 times with formaldehyde forming methylol groups, which are partly etherified with a C<sub>1</sub>-C<sub>8</sub> alkanol. Rätzsch Declaration at paragraph 6.

The etherified melamine resin is mixed with the high and low molecular weight diols (optionally in the presence of an acid as catalyst) and stirred at 60°C until a modified melamine resin having a viscosity of 3000 mPas (3 Pas) is obtained (see Example 1). Rätzsch Declaration at paragraph 6.

Under these reaction conditions, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. This is due to the fact that the process of re-etherification is an equilibrium reaction. Thus, in order to progress with the reaction at least one of the formed reaction products has to be removed from the reaction mixture. In case of re-etherification this could be done by evaporating the released C<sub>1</sub>-C<sub>8</sub>-alkanol. However, at 60°C – as taught by Horacek- not even methanol as the lowest alkanol evaporates with a reasonable velocity. Thus, the reaction does not progress after reaching equilibrium and a re-etherification with a diol simply cannot occur. Rätzsch Declaration at paragraph 6.

The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. This fact is also supported by the low viscosity of the resin since only the incorporation of long flexible bridges is able to provide for resins with a high viscosity and thus thermoplastic properties. Rätzsch Declaration at paragraph 6.

Furthermore, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. This statement is supported by the following facts: In order to impregnate the web-like fiber reinforcement the modified melamine resin is applied by dipping or spraying (column 3, lines 28-30 of Horacek). This implies that the melamin resin is at least partly soluble in an aqueous solution in order to be applied appropriately. A person skilled in the art is aware that these properties can only be accomplished by using a melamine resin with a very low number of linked triazine nuclei, especially lower than 20 nuclei. Rätzsch Declaration at paragraph 6.

In contrast to Horacek, the present invention relates to amino resins comprising mixtures of 20 to 100 triazine nuclei with thermoplastic properties. The present amino resins are obtainable in a process comprising several steps (see claim 25 and the corresponding description). In a first step a precondensate of C<sub>1</sub>-C<sub>8</sub>-aldehydes and triazine is etherified with C<sub>1</sub>-C<sub>8</sub>-alcohols at 25 to 150°C followed by conditioning the triazine derivatives at 150 to 250°C. In a second step the triazine derivatives of the first step are partially re-etherified with diols of type HO-R<sub>4</sub>-OH and/or bisepoxides at 60 to 250°C. In a third step the amino triazine ethers obtained in the second step are further condensed to

polytriazine ethers at 140 to 220°C. Especially in the third step a polycondensation to aminoplast having more than 20 triazine nuclei occurs. Rätzsch Declaration at paragraph 7.

Furthermore, the high viscosity of the present aminoplasts with values between 300 to 1400 Pas (see Tables on page 47 and 50 of the description) strongly indicates that the triazine nuclei are preferably connected via long bridges stemming from diols and/or bisepoxides introduced in the re-etherification step. Rätzsch Declaration at paragraph 7.

The first and second steps of the process are comparable to the process according Horacek. However, Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. To the contrary, the melamine resin according to Horacek can only exhibit a low number of less than 20 connected triazine nuclei. Rätzsch Declaration at paragraph 7.

A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

The following important effects are achieved:

a) A majority of methylol groups is removed especially in the second and third reactions step (see Examples 4 to 15 and 17 to 30 of the present application). A further network forming reaction between the melamine nuclei is thus not any longer possible. This provides for a thermally stable aminoplast and reduces the release of toxic formaldehyde.

b) The C<sub>1</sub>-C<sub>8</sub>-alcohol of the etherified is replaced by the diol and/or bisepoxide having higher evaporation temperatures (above 60°C) in the second re-etherification step. This allows for the removal of the C<sub>1</sub>-C<sub>8</sub>-alcohol having lower evaporation temperatures out of the reaction mixture by distilling. A part of the diol and/or epoxide is incorporated into the resin in a bifunctional manner. This provides for an increase of molecular weight as well as for long flexible bridges between the triazine nuclei. The long flexible bridges cause the unique thermoplastic properties of the present amino resins.

c) Only resins comprising such connected triazine nuclei are processable in the form of a thermoplastic melt. The resins according of Horacek are characterized by a low

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viscosity and thus do not have thermoplastic properties. In contrast, under the process conditions of the present invention the resin of Horacek would immediately connect to a non-meltable resin.

d) The present resins and the resins of Horacek differ very strongly in their physical properties. The resins of Horacek are liquid at room temperatures, whereas the present resins are solids and storable in form of granules (see for instance Examples 1 to 3 of the present application). Rätzsch Declaration at paragraph 7.

The teachings of Michel et al. do not cure these insufficiencies of Horacek.

Dr. Rätzsch is familiar with U.S. Patent No. 4,081,426 (Michel et al.). Michel et al. teaches a process for the preparation of aminoplasts whereby an aminotriazine is reacted with formaldehyde and a C<sub>1</sub>-C<sub>4</sub> alkanol at a pressure of at least 0.1 atm and temperatures between 80 to 130°C for 0.2 to 20 minutes. Preferably 0.77 to 3 mol formaldehyde and 2.5 to 7 mol alkanol per amino group of the melamine are used (column 1, lines 57-68). Thus, Michel et al. teaches the synthesis of a melamine-formaldehyde precondensate having a molar ratio of melamine/formaldehyde of 1:2.5 to 1:3.5. Michel et al. does not teach a re-etherification of the thus obtained aminoplast with diols and/or bisepoxides. Rätzsch Declaration at paragraph 8.

Thus, Michel et al. also does not teach an aminoplast comprising 20-1000 triazine nuclei combined through bridging members according to present claim 1. Rätzsch Declaration at paragraph 8.

Dr. Rätzsch is of the opinion that by combining the teachings of Horacek and Michel et al. a person skilled in the art would not arrive at the presently claimed invention. Rätzsch Declaration at paragraph 9.

A crucial step in obtaining thermoplastic aminoplasts with 20-1000 triazine nuclei is the condensation of the re-etherified aminotriazines following the re-etherification step. Neither Horacek nor Michel et al. teach or imply that a further condensation would provide aminoplasts comprising 20-1000 triazine nuclei having increased viscosity and improved flexibility. Rätzsch Declaration at paragraph 9.

On the contrary, Horacek and Michel et al. do not aim to obtain aminoplasts with high viscosity. Such aminoplasts would not be suitable for using as spraying or dipping

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agents according to Horacek or Michel et al. (see Example 48 – 50 of Michel et al.) since they are simply insoluble in the appropriate solvents and/or not liquid. Rätzsch Declaration at paragraph 8.

Even if a person skilled in the art would combine both teachings he would etherify a precondensate of aminotriazine and formaldehyde having a molar ratio of 1:2.5 to 1:3.5 with a C<sub>1</sub>-C<sub>4</sub>-alkanol at temperatures between 80 to 130°C (according to Michel et al.) followed by admixing diols to the etherified triazine at 60°C (according to Horacek). Thus, he would solely end up with an aminotriazine resin comprising triazine nuclei less than 20 in which diols are mixed into and not at the presently claimed aminotriazine having thermoplastic properties. Rätzsch Declaration at paragraph 8.

Claims 23, 24, 32-34 and 38 depend directly or indirectly from claim 22 and are distinguishable from the cited prior art for the same reasons as those discussed above with respect to claim 22.

Therefore, Applicants respectfully request that the §103(a) rejection of claims 22-24, 32-34, and 38 over Horacek and Michel et al. be reconsidered and withdrawn.

Claims 35-37 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek as applied to claim 33 above, and further in view of Recker et al. (U.S. Patent No. 4,336,180) as evidenced by Kloeppel, "Synthetic Molecular Sieves Binds Water Better than Zeolites". With respect to claims 35-37, Horacek allegedly teaches the product of claim 22, as stated above, but does not teach adding a molecular sieve to the product. However, Recker et al. allegedly teaches forming a resin in the presence of a molecular sieve (3:18-19). Horacek and Recker et al. allegedly are analogous art as they are concerned with the same field of endeavor, namely resins, thus the Office Action contends that it would have been obvious to a person having ordinary skill in the art at the time of the invention to have used molecular sieving in the product of Horacek as in Recker et al., and the motivation to do so would have been, as evidenced by Kloeppel, to absorb moisture from the etherification reaction (¶2).

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As discussed in detail above, under the reaction conditions disclosed in Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. At 60°C – as taught by Horacek- not even methanol as the lowest alkanol evaporates with a reasonable velocity. Thus, the reaction does not progress after reaching equilibrium and a re-etherification with a diol simply cannot occur. Rätzsch Declaration at paragraph 6.

The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. This fact is also supported by the low viscosity of the resin since only the incorporation of long flexible bridges is able to provide for resins with a high viscosity and thus thermoplastic properties. Rätzsch Declaration at paragraph 6.

Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6.

In contrast to Horacek, the present invention relates to amino resins comprising mixtures of 20 to 100 triazine nuclei with thermoplastic properties. The present amino resins are obtainable in a process comprising several steps. In a third step the amino triazine ethers obtained in the second step are further condensed to polytriazine ethers at 140 to 220°C. Especially in the third step a polycondensation to aminoplast having more than 20 triazine nuclei occurs. Rätzsch Declaration at paragraph 7.

Furthermore, the high viscosity of the present aminoplasts with values between 300 to 1400 Pas (see Tables on page 47 and 50 of the description) strongly indicates that the triazine nuclei are preferably connected via long bridges stemming from diols and/or bisepoxides introduced in the re-etherification step. Rätzsch Declaration at paragraph 7.

Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. To the contrary, the melamine resin according to Horacek can only exhibit a low number of less than 20 connected triazine nuclei. Rätzsch Declaration at paragraph 7.



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A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

Neither Recker et al. nor Kloeppel teach a re-etherification of a partly etherified melamine resin with diol or amino resins comprising mixtures of 20 to 100 triazine nuclei with thermoplastic properties as presently claimed. Recker et al. and Kloeppel were cited as disclosing use of molecular sieves. The teachings of Recker et al. and Kloeppel do not cure the insufficiencies of Horacek discussed above.

Claims 36 and 37 depend directly or indirectly from claim 35 and are distinguishable from the cited prior art for the same reasons as those discussed above with respect to claim 35.

Therefore, Applicants respectfully request that the §103(a) rejection of claims 35-37 over Horacek further in view of Recker et al. as evidenced by Kloeppel be reconsidered and withdrawn.

Claims 25, 26, 30, and 31 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek in view of Tsukiyama et al. (U.S. Patent No. 6,818,729), Rauwendaal, (Extrusion, Enc. of Polymer Science and Technology), Williams (Amino Resins, Enc. of Polymer Science and Technology) and Michel et al. (U.S. Patent No. 4,081,426).

With respect to claim 25, Horacek allegedly teaches reacting a melamine formaldehyde resin that has been etherified with C<sub>1-4</sub> alcohol/C<sub>1-4</sub>-oxa-C<sub>1</sub>-alkylene amino substituted triazine (1:59-63 and 2:1-2) with a diol mixture with up to 75% C<sub>2-12</sub> diols and polyether diols (1:64-68) at 60°C and 1 atm (Example 1), where the amino groups are used in weight percent of 4:3 of the diols/~4:3 mol percent (Example 1), then further reacting the mixture for 5 minutes at 120°C (Example 1).

The Office Action acknowledges that Horacek does not teach reacting the diol and resin for the claimed time. However, Tsukiyama et al. allegedly teaches reacting a melamine resin with a diol for 1 to 60 m (4:55-59). Horacek and Tsukiyama et al. allegedly are analogous art as they are concerned with the same field of endeavor, namely melamine

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formaldehyde resins, thus the Office Action contends that it would have been obvious to a person having ordinary skill in the art at the time of the invention to have reacted the reactants for the amount of time of Tsukiyama et al. in the process of Horacek, and the motivation to do so would have been, as Tsukiyama et al. suggests, this time will produce the desired resin crosslinking (4:58-59).

Also, the Office Action acknowledges that Horacek does not teach the second reaction as occurring at a temperature between 140 and 220°C. However, the Office Action contends that changes in temperature generally will not support patentability, and that it would have been obvious to a person having ordinary skill in the art at the time of invention to have optimized the temperature of the reaction through routine optimization, the motivation to do so being to increase the curing rate and decrease the processing time.

The Office Action acknowledges that Horacek does not teach degassing the composition. However, Rauwendaal allegedly teaches degassing a polymer composition (Section 10). Horacek and Rauwendaal allegedly are analogous art as they are concerned with the same field of endeavor, namely polymer processing, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have degassed the composition of Horacek as in Rauwendaal, and the motivation to do so would have been, as Rauwendaal suggests, to remove volatile components that can create voids in the final product (Section 10).

The Office Action acknowledges that Horacek does not teach granulating the composition. However, Williams allegedly teaches granulating an amino resin molding composition (Section 6). Horacek and Williams allegedly are analogous art as they are concerned with the same field of endeavor, namely amino resin compositions, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have granulated the composition of Horacek as in Williams, and the motivation to do so would have been, as Williams suggests, providing a product that is easier to handle (Section 6).

The Office Action acknowledges that Horacek does not teach the method of making the etherified precondensate. However, Michel et al. allegedly teaches forming an etherified precondensate of melamine and formaldehyde by heating to from 85 to 115°C at a pressure of greater than 1.5 atm/bar (2:22-35) a mixture of a melamine formaldehyde

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condensate and methanol (1:63-2:21) in the presence of weakly acidic medium (2:36-54). Michel et al. also teaches conditioning the condensate at 110°C for 12 minutes at 3.5 atm (Example 1). The Office Action contends that it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the method of making the condensate of Michel et al. in the process of Horacek, and the motivation to do so would have been, as Michel et al. suggests, the desired product can be made in a short reaction time (2:61-63).

The Office Action acknowledges that Horacek does not teach the conditioning as occurring at the claimed temperature. However, the Office Action contends that changes in temperature generally will not support patentability and it would have been obvious to a person having ordinary skill in the art at the time of invention to have optimized the temperature of the reaction through routine optimization, and the motivation to do so would have been to increase the reaction rate and degree of condensation of the precondensate.

With respect to claim 26, Horacek allegedly teaches using an organic acid as a catalyst (3:11-15). With respect to claim 30, Horacek allegedly teaches using different initial products in the condensation (2:26-42).

With respect to claim 31, Horacek does not teach the process as taking place in a single reaction instillation. However, Williams allegedly teaches making an amino resin in a single unit (Section 4). Horacek and Williams are analogous art as they are concerned with the same field of endeavor, namely amino resins, thus it would have been obvious to a person having ordinary skill in the art at the time of the invention to have used a single reaction instillation in the process of Horacek as in Williams, and the motivation to do so would have been, as Williams suggests, it is a functional alternative to non-continuous processes (Section 4).

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

Numerous references are discussed in the above rejection in an attempt to piece together the presently claimed process by improper hindsight reconstruction. None of the cited references cures the deficiencies of Horacek.

As discussed in detail above, under the reaction conditions disclosed in Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6. Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

None of the other cited references, Tsukiyama et al., Rauwendaal et al., Williams or Michel et al., taken alone or in combination, cures these deficiencies of Horacek. The mixtures described in Tsukiyama et al. are merely physical mixtures of verified melamine resins and polyethylene glycols, which do not react chemically but – if at all – in the last step of hardening. Rauwendaal et al. is cited merely for degassing. Williams is cited merely for granulating. As discussed in detail above, Michel et al. does not teach a re-etherification of the thus obtained aminoplast with diols and/or bisepoxides. A crucial step in obtaining thermoplastic aminoplasts with 20-1000 triazine nuclei is the condensation of the re-etherified aminotriazines following the re-etherification step. Michel et al. does not teach an aminoplast comprising 20-1000 triazine nuclei combined through bridging members according to present claim 25. Rätzsch Declaration at paragraph 9.

Claims 26, 30, and 31 depend directly or indirectly from claim 25 and are distinguishable from the cited prior art for the same reasons as those discussed above with respect to claim 25.

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Therefore, Applicants respectfully request that the §103(a) rejection of claims 25, 26, 30 and 31 over Horacek in view of Tsukiyama et al., Rauwendaal, Williams and Michel et al. be reconsidered and withdrawn.

Claim 27 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek in view of Tsukiyama et al., Rauwendaal, Williams and Michel et al. as applied to claim 25 above, and further in view of Recker et al. as evidenced by Kloeppel.

The Office Action acknowledges that Horacek does not teach adding a molecular sieve to the process. However, Recker et al. allegedly teaches forming a resin in the presence of a molecular sieve (3:18-19). Horacek and Recker et al. are analogous art as they are concerned with the same field of endeavor, namely resins, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have used molecular sieving in the method of Horacek as in Recker et al., and the motivation to do so would have been, as evidenced by Kloeppel, to absorb moisture from the etherification reaction (112). Also, although Recker et al. does not explicitly teach the amount of molecular sieving as being in the claimed range, it would have been obvious to a person having ordinary skill in the art at the time of invention to have optimized the range to achieve the best results.

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As discussed in detail above, under the reaction conditions disclosed in Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6. Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is

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achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

None of the other cited references, Tsukiyama et al., Rauwendaal et al., Williams, Michel et al., Recker et al. or Kloeppel, taken alone or in combination, cures these deficiencies of Horacek. The mixtures described in Tsukiyama et al. are merely physical mixtures of verified melamine resins and polyethylene glycols, which do not react chemically but – if at all – in the last step of hardening. Rauwendaal et al. is cited merely for degassing. Williams is cited merely for granulating. As discussed in detail above, Michel et al. does not teach a re-etherification of the thus obtained aminoplast with diols and/or bisepoxides. A crucial step in obtaining thermoplastic aminoplasts with 20-1000 triazine nuclei is the condensation of the re-etherified aminotriazines following the re-etherification step. Michel et al. does not teach an aminoplast comprising 20-1000 triazine nuclei combined through bridging members according to present claim 25. Recker et al. and Kloeppel were cited as disclosing use of molecular sieves. The teachings of Tsukiyama et al., Rauwendaal et al., Williams, Michel et al., Recker et al. and Kloeppel do not cure the insufficiencies of Horacek discussed above.

Therefore, Applicants respectfully request that the §103(a) rejection of claim 27 over Horacek in view of Tsukiyama et al., Rauwendaal, Williams and Michel et al., and further in view of Recker et al. as evidenced by Kloeppel be reconsidered and withdrawn.

Claims 28 and 29 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek in view of Tsukiyama et al., Rauwendaal, Williams and Michel et al. as applied to claim 25 above, and further in view of D'Alelio (U.S. Patent No. 3,053,797).

The Office Action acknowledges that Horacek does not teach the re-etherification as taking place at temperatures as claimed. However, D'Alelio allegedly teaches the polymerization/re-etherification as taking place at temperatures of 100-250°C (12:55-59). Horacek and D'Alelio allegedly are analogous art as they are concerned with the same field of endeavor, namely triazine polymers, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the temperature of D'Alelio in the method of Horacek, and the motivation to do so would have been to increase the reaction rate.

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Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As discussed in detail above, under the reaction conditions disclosed in Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6. Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

None of the other cited references, Tsukiyama et al., Rauwendaal et al., Williams, or Michel et al., taken alone or in combination, cures these deficiencies of Horacek. The mixtures described in Tsukiyama et al. are merely physical mixtures of verified melamine resins and polyethylene glycols, which do not react chemically but – if at all – in the last step of hardening. Rauwendaal et al. is cited merely for degassing. Williams is cited merely for granulating. As discussed in detail above, Michel et al. does not teach a re-etherification of the thus obtained aminoplast with diols and/or bisepoxides. A crucial step in obtaining thermoplastic aminoplasts with 20-1000 triazine nuclei is the condensation of the re-etherified aminotriazines following the re-etherification step. Michel et al. does not teach an aminoplast comprising 20-1000 triazine nuclei combined through bridging members according to present claim 25.

Dr. Rätzsch is also familiar with the patent US 3,053,797 (D'Alelio). D'Alelio teaches polymerizable triazines and polymers thereof. The triazines are characterized by at least one substituent carrying an epoxy group. The epoxy group is

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preferably attached to the triazine ring via an aromatic hydrocarbon radical by the way of  
-NH/O/S-divalent aromatic hydrocarbon radical-O/S-Epoxy (column 5, lines 37-46).  
Rätzsch Declaration at paragraph 8.

The epoxy-substituted triazines can be used for producing thermosetting polymers (column 12, lines 32-36). In general, the epoxy-substituted triazines can be reacted with water or with organic compounds containing one or more active hydrogens, such as alcohols, acids, amines phenols, polyvinyl alcohol or phenol-formaldehyde resin (column 13, lines 25-36). These polymers would be characterized by bridging members comprising  
-NH/O/S-divalent aromatic hydrocarbon radical-O/S-CH<sub>2</sub>-CHOH-CH<sub>2</sub>- (column 5, lines 37-49). Rätzsch Declaration at paragraph 8.

In contrast, the present invention relates to polytriazine ethers wherein the triazine segments are combined through bridging members -NH-CHR<sub>2</sub>-O-R<sub>4</sub>-O-CHR<sub>2</sub>-NH- and -NH-CHR<sub>2</sub>-NH-. Thus, there are clearly **structural differences** between bridging members according to the present invention and the teaching of D'Alelio and thus between the polymers. Rätzsch Declaration at paragraph 8.

Therefore, a person skilled in the art would not consider the teaching of D'Alelio of bridging members comprising -NH/O/S-divalent aromatic hydrocarbon radical-O/S-CH<sub>2</sub>-CHOH-CH<sub>2</sub>- in order to arrive at the presently claimed invention, and the teachings of D'Alelio, taken alone or in combination with the cited references discussed above, do not cure the insufficiencies of the cited prior art as set forth in the rejection. Rätzsch Declaration at paragraph 8.

Therefore, Applicants respectfully request that the §103(a) rejection of claims 28 and 29 over Horacek in view of Tsukiyama et al., Rauwendaal, Williams and Michel et al. as applied to claim 25 above, and further in view of D'Alelio be reconsidered and withdrawn.

Claims 39-42 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek, in view of Dorries et al. (U.S. Patent No. 4,535,031) and Goldsworthy et al. Composites, Fabrication.

With respect to claim 39, Horacek teaches an amino resin molding composition (3:46-48) comprising polytriazine ethers (1:6) comprising triazine segments that have been partly etherified with alkanols/R<sub>3</sub> (2:7-13) and polyether diols/R<sub>4</sub> (2:40-42) where



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the triazines are combined through bridging members that are polyethers/-NH-CHR<sub>2</sub>-O-R<sub>4</sub>-O-CHR<sub>2</sub>-NH- (2:40-42), or formaldehyde/-NH-CHR<sub>2</sub>-NH- (2:7-11), wherein the molar ratio of the substituents R<sub>3</sub>:R<sub>4</sub> are 20:1 to 1:20 (1:45-55), the proportion of the combination of the triazine segments through the polyethers is from 5 to 95 mol% (1:50-55). Although the number of nuclei is not explicitly taught, the weight percentages allegedly could easily be manipulated to give the desired numbers. Horacek also teaches melt impregnating of fibers (3:27-32) at mass temperatures of 105 to 260°C (3:39-46) and melt impregnating component blanks (3:27-32)

The Office Action states that Horacek does not teach the curing as taking place for 2 to 12 minutes. However, Dorries et al. allegedly teaches curing an aminoplast for 2 to 12 minutes (15:14-29). Horacek and Dorries et al. allegedly are analogous art for they are concerned with the same field of endeavor, namely aminoplast resins, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have cured the resin for the time in Dorries et al. in the process of Horacek, and the motivation to do so would have been, as Dorries et al. suggests, to give a well cured product (1 5:18-20 and 15:26-29).

The Office Action acknowledges that Horacek does not teach the melt impregnating as being preformed according to one of the claimed techniques. However, Goldsworthy et al. allegedly teaches making a product through pultrusion (Section 3.1). Horacek and Goldsworthy et al. are analogous art as they are concerned with the same field of endeavor, namely composite production, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the pultrusion of Goldsworthy et al. in the process of Horacek, and the motivation to do so would have been, as Goldsworthy et al. suggests, making the articles in a one step process (Section 3.1). With respect to claim 41, Horacek allegedly teaches the polytriazine ethers being made from a formaldehyde condensation/R<sub>2</sub>=H (2:7-15). With respect to claim 42, Horacek allegedly teaches using p-toluene-sulphonic acid as a hardening agent (3:11-15).

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As discussed in detail above, under the reaction conditions disclosed in

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Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6. Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

Dorries et al. discusses the production of melamine-formaldehyde resins as they are known in the state of the art. A curing step of resin itself is not shown. The curing step concerns the ready made prepreg compound. Goldsworthy et al. is cited for making a product through pultrusion. Neither of Dorries et al. and Goldsworthy et al., taken alone or in combination cures the deficiencies of Horacek.

Therefore, Applicants respectfully request that the §103(a) rejection of claims 39-42 over Horacek in view of Dorries et al. and Goldsworthy et al. be reconsidered and withdrawn.

Claim 43 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek in view of Dorries et al. and Goldsworthy et al., as applied to claim 39 above, and further in view of Yagi et al. (U.S. Patent No. 5,624,627), Getchell et al. (U.S. Patent No. 3,982,410) and Marco et al. (U.S. Patent No. 5,856,313). With respect to claim 43, Horacek, Dorries et al. and Goldsworthy et al. allegedly collectively teach the process of claim 39 as claimed above, but Horacek does not teach mixing the melt with a dispersion agent. However, Yagi et al. allegedly teaches mixing a resin and a paraffin oil (10:10-13) in a melt kneader at a temperature of 160 to 220°C (10:37-47). Horacek and Yagi et al. allegedly are analogous art as they are concerned with the same field of endeavor, namely resin production,

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thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have mixed a dispersion agent into the resin as in Yagi et al. in the process of Horacek, and the motivation to do so would have been, as Yagi et al. suggests, to increase the processability of the resin (1:51-64).

The Office Action acknowledges that Horacek does not teach treating the resin with an acid gas. However, Getchell et al. allegedly teaches treating a polymer fiber mixture with an acid gas (10:50-54). Horacek and Getchell et al. are analogous art as they are concerned with the same technical difficulty, namely impregnating fibers, thus it would have been obvious to a person having ordinary skill in the art at the time of the invention to have used the acid gas of Yagi et al. in the process of Horacek, and the motivation to do so would have been, as Yagi et al. suggests, to fix the polymer in the fiber (9:47-50).

The Office Action acknowledges that Horacek does not teach the mixture as being conveyed through a sieve separator. However, Marco et al. allegedly teaches putting a fiber through a sieve separator (2:12-16). Horacek and Marco et al. are analogous art as they are concerned with the same technical difficulty, namely the manufacture of fibers, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the sieve separation step of Marco et al. in the process of Horacek, and the motivation to do so would have been, as Marco et al. suggests, to obtain fibers of the desired size (2:16-17).

The Office Action acknowledges that Horacek does not teach extracting the dispersion agent. However, Yagi et al. allegedly teaches extracting a plasticizer/dispersion agent with low boiling hydrocarbons (11:10-20), thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have used the extraction step of Yagi et al. in the process of Horacek, and the motivation to do so would have been, as Yagi et al. suggests, to create a product of high tensile strength (3:47-60).

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As discussed in detail above, under the reaction conditions disclosed in Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. The increase of molecular

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weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6. Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

Dorries et al. discusses the production of melamine-formaldehyde resins as they are known in the state of the art. A curing step of resin itself is not shown. The curing step concerns the ready made prepreg compound. Goldsworthy et al. is cited for making a product through pultrusion. The teachings of Dorries et al., Goldsworthy et al. further in view of Yagi et al., Getchell et al. and Marco et al., taken alone or in combination with Horacek, do not remedy the deficiencies of Horacek.

Therefore, Applicants respectfully request that the §103(a) rejection of claim 43 over Horacek in view of Dorries et al. and Goldsworthy et al., as applied to claim 39 above, and further in view of Yagi et al., Getchell et al. and Marco et al. be reconsidered and withdrawn.

Claim 44 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Horacek in view of Michel et al., as applied to claim 33 above, and further in view of Goldsworthy et al. With respect to claim 44, Horacek teaches the composition of claim 33 as stated above, however, Horacek does not teach making a product as claimed from the composition. However, Goldsworthy et al. allegedly teaches making a foamed container from a composite material (Section 3.6.3). Horacek and Goldsworthy et al. are analogous art as they are concerned with the same field of endeavor, namely composite production, thus it would have been obvious to a person having ordinary skill in the art at the time of invention to have made a container from the composition of Horacek as in Goldsworthy et al. and the

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motivation to do so would have been, as Goldsworthy et al. suggests, giving an insulated container for transportation (Section 3.6.3).

Applicants respectfully traverse the §103(a) rejection and request that the rejection be reconsidered and withdrawn.

As discussed in detail above, under the reaction conditions disclosed in Horacek, only a simple mixing of the diol with the etherified resin is achieved, but **not** a re-etherification of the partly etherified melamine resin with diol. The increase of molecular weight according to Horacek is only due to a simple bridging of the melamine nuclei via methylene or methylenoxy bridges but **not** via long diol-oxy-bridges as in the present amino resins. Furthermore, as discussed above, in Dr. Rätzsch's point of view and experience the melamine resins obtained by Horacek comprise less than 20 triazine nuclei. Rätzsch Declaration at paragraph 6. Horacek does not include the third step of further condensing the etherified melamine resin. Thus, it is **not** possible that in a process according to Horacek a melamine resin with high number of triazine nuclei is synthesized. A further difference between the present invention and the teaching of Horacek et al. can be seen in the higher degree of etherification and the thermal removal of methylol groups in the resin. This is achieved by applying higher temperatures in the synthesis process. Rätzsch Declaration at paragraph 7.

As discussed in detail above, Michel et al. does not teach a re-etherification of the thus obtained aminoplast with diols and/or bisepoxides. A crucial step in obtaining thermoplastic aminoplasts with 20-1000 triazine nuclei is the condensation of the re-etherified aminotriazines following the re-etherification step. Michel et al. does not teach an aminoplast comprising 20-1000 triazine nuclei combined through bridging members according to present claim 25. Rätzsch Declaration at paragraph 9.

Goldsworthy et al. is cited for making a product through pultrusion.

The teachings of Michel et al. and Goldsworthy et al., taken alone or in combination, do not cure the deficiencies of Horacek noted above. Accordingly, Applicants respectfully request that the §103(a) rejection of claim 44 over Horacek in view of Michel et al. and Goldsworthy et al. be reconsidered and withdrawn.

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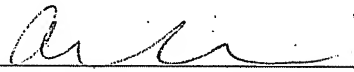
Therefore, Applicants respectfully request that this Request for Reconsideration be considered and that the pending rejections be reconsidered and withdrawn.

Respectfully submitted,

THE WEBB LAW FIRM

Date November 14, 2008

By



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